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# Data set generation at novel test-rig for validation of numerical models using in-house algorithms

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Still, in the world of computer simulation, a great need is directed towards a fast, accurate and efficient numerical model to simulate interactions between particles. Currently available computational techniques such as Hybrid Euler-Lagrange (HEL) [1], Discrete Element Method (DEM)[2] are used to simulate granular flows. In HEL, interactions between solid phase are calculated on the basis of Kinetic Theory of Granular Flow (KTGF), where collisions are determined from solid volume fraction in computational cell, the time needed to obtain results is relatively short. In DEM, calculating all possible particles interactions is computationally expensive as well as time consuming. In order to speed up the calculations, at the same time maintaining their collision detection accuracy, a Reduced Order Model was built using machine learning algorithms. The mail of the idea is to use a large dataset of particles (pre- and post-collision particle information) and to build a machine learning model capable of predicting new values of, i.e. velocity. In this way, the model created will be used as part of the HEL approach to replace particle interaction forces based on the solid volume fraction with forces obtained using the DEM. In parallel the measurements were made on an experimental rig of the collisions between the two particle streams. The experiment itself was then imitated, in simulations using the DEM model. The collected data will serve as a validation set for further analysis. Both experimental and simulation results will be compared using in-house algorithms.

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